

THE GENUS *PTEROSTYLIS* R.Br. [ORCHIDACEAE].

A NEW SCHEME OF CLASSIFICATION, WITH NOTES ON THE DISTRIBUTION
OF THE AUSTRALIAN SPECIES.

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(Thirty-eight Text-figures.)

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Difficulties of determination in the genus *Pterostylis* arise largely through the fact that affinities and points of resemblance between the different species are curiously complicated, features of association between certain forms being accompanied by divergent features which suggest quite other relationships. As a result it is probable that whatever characteristics be taken as the bases of the primary and secondary groups of the genus, opinions will differ as to whether other characteristics would not have served the purpose better. The aim of the classification proposed in this paper is simply to provide a clearer and more direct route to the identification of species than is now available; and whatever criticism may be fairly applied to it, I think it will be conceded that here a strange form may be readily traced from larger to smaller groups until it is either isolated, or restricted to the company of a few other species. At that point the scheme ends, and ultimate descriptions must be sought in existing publications. Accompanying the table of distribution of Australian species which follows the scheme, I have given references for each species; and in selecting these references I have been guided by practical considerations, believing that a reliable illustration of the plant or its flower is a very great help towards determining identity.

A few non-Australian species of *Pterostylis* are unknown to me, but I have in my herbarium most of the New Zealand forms which have been described, and some which are still awaiting description. All these can be fitted into the new classification, and from such information as I have been able to glean I think the scheme provides a place for all known forms.

Robert Brown primarily divided the species known to him according to the character of the appendage found at the base of the labellum. This basis of classification seems more appropriate for use in subdivisions than in primary sections, but in any case it presents difficulties which have increased with the number of species. In Bentham's "Flora Australiensis" we are given two primary sections: (1) *Antennaea*, in which the lower sepals are erect with their free portions embracing the galea, and (2) *Catochilus*, in which they are reflexed in front of the ovary. This is a very important distinction, especially if we take "reflexed" as equivalent to "deflexed or spreading"; but it involves certain anomalies in the subdivisions, and in particular is open to the following criticisms: (1) The classification includes in *Catochilus* two species (*P. barbata* Lindl. and *P. turfosa* Endl.) which have hardly anything in common (beyond generic

character) with their associates, except the attitude of the lower sepals, and which indeed in the character of the labellum and other features differ strikingly from all other species in the genus. (2) In both *Antennaea* and *Catochilus* we find species with (a) basal rosette or cluster and no stem leaves, (b) stem leaves and no clearly recognized basal rosette, (c) basal rosette (or cluster) plus stem leaves. This duplication is perplexing to those not well versed in the genus, since these features, discernible at a glance, at once suggest a means of narrowing the search for a species down to one of three groups, yet the groups are found to be split up between the two sections.

In the scheme set out below, it may be objected that *Catochilus* itself has been split up, not only between the two primary sections, but also among the subdivisions of Section A. This is true, yet this distribution will be found less confusing than the anomalies referred to above; and it will be found that the new scheme permits the segregation of the most closely allied forms of *Catochilus* into groups just as before. The feature upon which Bentham's sections are based is too important to be lost sight of; I have retained his terms *Antennaea* and *Catochilus*, which will be found bracketed against the groups associated with them.

I had decided to omit from the Australian species named in the scheme *P. clavigera* Fitzg., *P. pyramidalis* Lindl., and *P. Suttonii*. In deference, however, to the opinion of Dr. R. S. Rogers I retain the first two, at the same time giving my reasons for my former intention. *P. clavigera* does not appear to have been seen by anyone since Mr. A. G. Hamilton collected it near Mudgee more than 40 years ago. Mr. Hamilton took it for *P. nana*, and although no specimens are known to exist, drawings and descriptions are at least hardly adverse to this opinion. Dr. Rogers, however, has reminded me of Fitzgerald's unpublished plate in the Mitchell Library at Sydney, and it must be admitted that the details—particularly of the column—are not reconcilable with the type of *P. nana*. I agree therefore that until fresh material is available we should give the species the benefit of such doubt as may exist about it. The case of *P. pyramidalis* is different. This plant is peculiar to Western Australia. In the course of some years I have received numerous specimens—most of them from Lieut.-Col. B. T. Goadby. I have been unable to detect the slightest difference in the floral structure from that of *P. nana*. But the type form of *P. pyramidalis* has no basal rosette, and well-formed stem leaves are present alternating up the stem. This gives it a very distinctive appearance, and compels me to place it far from *P. nana*, in spite of the complete identity of floral structure. Dr. Rogers considers it a larger plant than *P. nana*, but there are records of dimensions of the latter not far behind those he gives for *P. pyramidalis*. *P. nana* is also in Western Australia, and I have received intermediate forms with both basal and cauline leaves. It seemed to me therefore that *P. pyramidalis* should be treated as a Western Australian variant of *P. nana*, its foliation constituting an exception to the rule of Section A, Subsection A. This view has the support of some of my fellow-workers in orchid study, but Dr. Rogers, who has seen and collected *P. pyramidalis* in its native haunts, considers it wiser to keep these two separate. With regard to *P. Suttonii*—a small, solitary specimen reached me some years ago from Tasmania with this name attached. The Ven. Archdeacon Atkinson, who sent it, was uncertain of the founder of the species, and all efforts to discover any reference to the name have failed. I do not feel justified, therefore, in including it.

The following two notes affect certain groups in the classification:

(1) Section A, Subsection A.—Exception to description of Subsection: *P. alpina* Rogers.—No radical rosette or cluster of leaves has been observed in this species: but it is so obviously closely allied to its neighbours that I prefer to leave it with them and note the exception. Mr. E. E. Pescott (Orchids of Victoria, p. 82) would apparently include *P. furcata* Lindl. in the same category, but my own experience of the species does not confirm this (see also Plate VIII in Rogers, Notes on Certain Species of *Pterostylis*, Proc. Roy. Soc. Victoria, Nov., 1915).

(2) Section A, Subsection A, Division I. "Stem leaves reduced to bracts."—When these plants occur in long grass or undergrowth, there is a tendency for the radical rosette to disintegrate, the leaves ascending the stem towards the light. This is very noticeable in *P. nutans* R. Br. and *P. Baptistii* Fitzg.; and I am confident that Fitzgerald's type specimens of the latter must have grown under such conditions, for the foliation depicted by him is quite unusual. (When it was described, the species was known only in one locality.) The normal habit of *P. Baptistii* is undoubtedly to produce a very definite and fairly compact radical rosette, with merely 2-3 more or less appressed bracts on the stem. In the young stage its rosette is very similar to that of *P. pedunculata* R. Br.

It will be observed that I include *P. Daintreyana* F.v.M. in a *Catochilus* group, not in *Antennaea* as Bentham does. This treatment is already, I think, endorsed by general consent of all who know the species.

PTEROSTYLIS R. Br.

Section A. *Laminatae*.—Labellum laminate, from broadly oblong to linear, usually with entire margins but occasionally cleft or emarginate at the apex, the lamina and margins sometimes beset with translucent setae. Galea curving forward.

Section B. *Filiformae*.—Labellum filiform-terete, beset with long yellow hairs nearly to the apex, where it terminates in a dark, knob-like appendage. Galea erect.

Section A.

Subsection A.—Radical leaves in a rosette or cluster encircling the base of the stem. Stem leaves reduced to sheathing bracts or scattered along the stem. [Exception: *P. alpina*. See above, Note (1).]

Division I.—Stem leaves reduced to bracts. [See above, Note (2).]

i. Flower solitary (rarely 2), sometimes large. Lower sepals erect.

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| Antennaea | Benth. | { | 1. Labellum bifid. Bracts 2, or reduced to the one under the ovary.— <i>P. ophioglossa</i> R. Br., <i>P. concinna</i> R. Br. |
| | | | 2. Labellum entire. Bracts 2 or 3. <ul style="list-style-type: none"> a. Labellum linear-lanceolate, decurved.—<i>P. acuminata</i> R. Br., <i>P. Baptistii</i> Fitzg., <i>P. curta</i> R. Br., <i>P. nutans</i> R. Br., <i>P. Vereenae</i> Rogers, <i>P. depauperata</i> Bailey. b. Labellum oblong, nearly straight.—<i>P. nana</i> R. Br. [but see note above on <i>P. pyramidalis</i>], <i>P. pedoglossa</i> Fitzg., <i>P. pedunculata</i> R. Br. |

ii. Flowers racemose or spicate, seldom large. Lower sepals deflexed or spreading.

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| Catochilus | Benth. | { | 1. Labellum shortly oblong, entire, bare. Sepals short and blunt.— <i>P. mutica</i> R. Br., <i>P. cynocephala</i> Fitzg. |
| | | | 2. Labellum ovate-oblong, sometimes emarginate, with a few long marginal setae and very small crowded laminal ones. Sepals acuminate or prolonged into filiform points.— <i>P. rufo</i> R. Br., <i>P. pusilla</i> Rogers, <i>P. Mitchellii</i> Lindl., <i>P. squamata</i> R. Br., <i>P. Woollsi</i> Fitzg. |

Division II.—Stem leaves well developed, scattered. Flower solitary (rarely 2), often large. Lower sepals erect.

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| Antennaea | { | i. Labellum minutely bifid. Radical leaves 2-4.— <i>P. furcillata</i> Rupp. |
| | | ii. Labellum entire. Radical leaves many or few, rarely absent.— <i>P. cucullata</i> R. Br., <i>P. falcata</i> Rogers, <i>P. alpina</i> Rogers [see note above], <i>P. furcata</i> Lindl., <i>P. gracilis</i> Nicholls. |

Subsection B.—Radical leaves in a rosette usually independent of the stem, occasionally attached to it by a scape, but rarely encircling it, and often absent at flowering time. Stem leaves at the base reduced to minute bracts, above usually well developed and regularly alternate: occasionally bract-like.

Division I.—Flower solitary (rarely 2), sometimes large. Lower sepals erect with long filiform points.

- Antennaea {
- i. Labellum clavate at the apex.—*P. grandiflora* R. Br., *P. constricta* Sargent.
 - ii. Labellum minutely bifid.—*P. Toveyana* Ewart and Sharman.
 - iii. Labellum entire [occasionally bifid in *P. Rogersii*].
 - 1. Labellum acute or acuminate [occasionally obtuse in *P. truncata*].—*P. alata* Reichb. f., *P. robusta* Rogers, *P. Rogersii* Coleman, *P. revoluta* R. Br., *P. reflexa* R. Br., *P. coccinea* Fitzg., *P. truncata* Fitzg.
 - 2. Labellum obtuse.—*P. obtusa* R. Br., *P. decurva* Rogers, *P. recurva* Benth., *P. pyramidalis* Lindl.

Division II.—Flowers racemose (rarely solitary), very small. Lower sepals erect, very short. Rosette sometimes encircling the stem.—*P. parviflora* R. Br. (Antennaea.)

Division III.—Flowers racemose (rarely solitary), seldom large. Lower sepals deflexed or spreading.

- Catochilus {
- i. Labellum deeply trifid.—*P. Sargentii* Andrews.
 - ii. Labellum entire or emarginate.—*P. Daintreyana* F.v.M., *P. longifolia* R. Br., *P. vittata* Lindl.

Section B.—Flower usually solitary, often rather large. Lower sepals more or less deflexed. Leaves radical and cauline, only slightly spreading.—*P. barbata* Lindl., *P. turfosa* Endl. (Catochilus.)

The distribution of these 46 species is interesting. Only one*—*P. rufa* R. Br.—is recorded from every State, and in view of the considerable confusion between this species and its nearest allies, I think it is more than likely that some of the records should be transferred to *P. pusilla*, *P. Mitchellii*, or *P. squamata*. The distinctions are admirably set out on p. 42 of Dr. Rogers' "South Australian Orchids". There are, however, certain forms frequently included in *P. pusilla* which do not quite conform to Dr. Rogers' descriptions of that species, being more robust, carrying more flowers, and having simpler details in the labellum. One of these—a New South Wales form—I have named var. *prominens* (Proc. Linn. Soc. N.S.W., lvi, 1931). This is linked up with the type by certain intermediate forms in southern States. In the table of distribution which follows, I have queried the records of *P. squamata* in Tasmania, because I have reason to

* Since this paper was read I have been informed that *P. nutans* has been discovered in Western Australia, and if this be so it also occurs in all States.

A. Examples of labellum in Section A (Laminatae).

B. Labellum in Section B (Filiformae).

1-4. Foliation and inflorescence in Section A, sub-section A. 1-2, Division I, i (*P. nutans*, *P. ophioglossa*); 3, Division I, ii (*P. pusilla* v. *prominens*); 4, Division II (*P. falcata*).

5-7. Foliation and inflorescence in Section A, sub-section B. 5-6, Division I (*P. reflexa*, *P. truncata*); 7, Division III (*P. longifolia*).

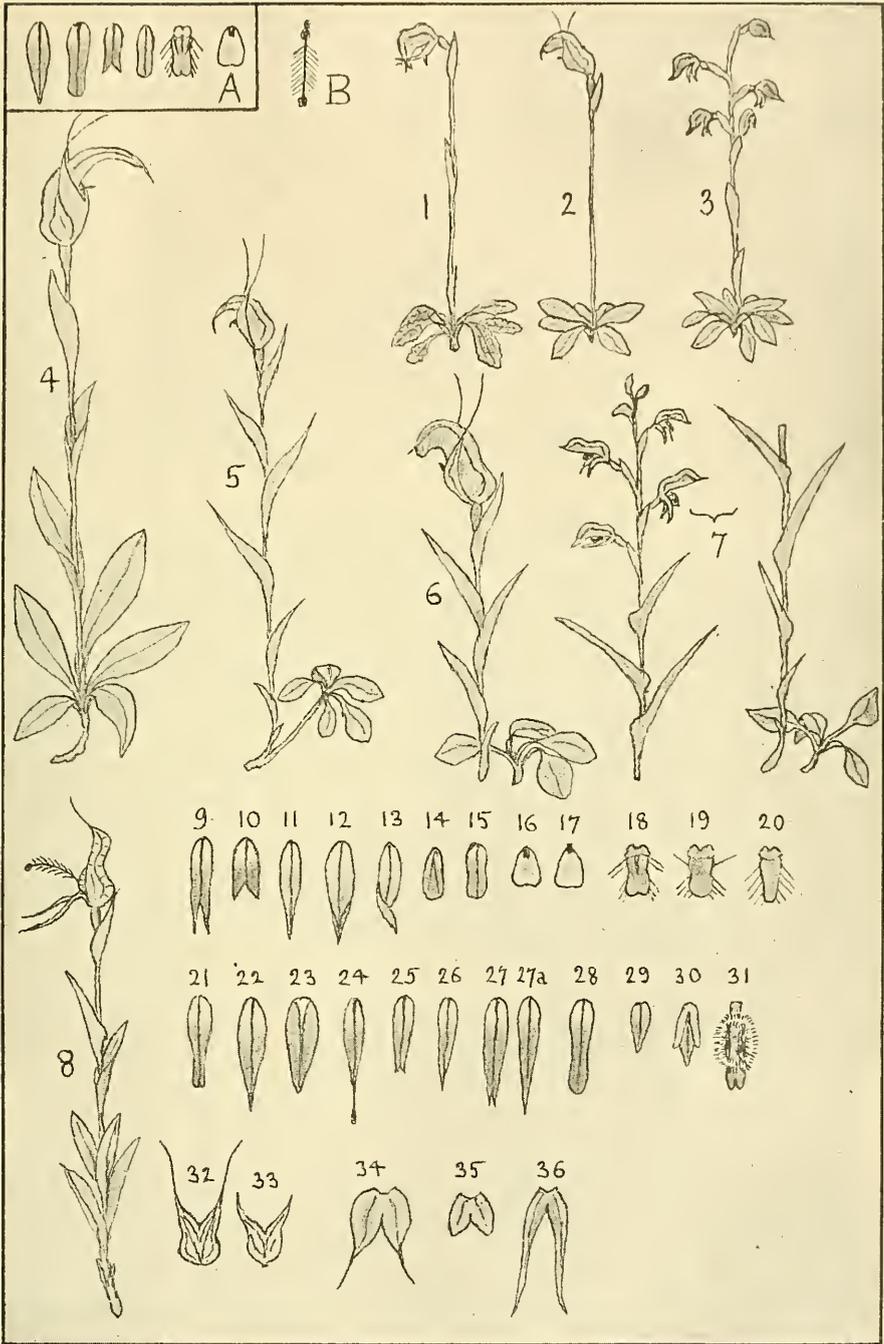
(Division II is omitted, as it contains but one species, with the smallest flowers in the genus.)

8. Foliation and inflorescence in Section B (*P. turfosa*).

9-31. Labella, front view (flattened out), of various species in Section A.—9, *P. ophioglossa*; 10, *P. concinna*; 11, *P. acuminata*; 12, *P. Baptistii*; 13, *P. curta*; 14, *P. pedunculata*; 15, *P. nana*; 16, *P. mutica*; 17, *P. cyenocephala*; 18, *P. pusilla*; 19, *P. rufa*; 20, *P. Mitchellii*; 21, *P. furcillata*; 22, *P. revoluta*; 23, *P. cucullata*; 24, *P. grandiflora*; 25, *P. Toveyana*; 26, *P. alata*; 27, 27a, *P. Rogersii*; 28, *P. obtusa*; 29, *P. parviflora*; 30, *P. Daintreyana*; 31, *P. longifolia*.

32, 33, erect lower sepals.

34, 35, 36, deflexed lower sepals.



Text-figures A, B, 1-36.

Genus *Pterostylis* R. Br.—Figures of Australian Species illustrating the classification proposed in this paper.

believe that *P. pusilla* should replace it. I have collected the last-named near Launceston: the specimens agree precisely with a Tasmanian specimen in the National Herbarium at Melbourne, endorsed by F. v. Mueller as *P. squamata*; but if Fitzgerald interprets the latter rightly it is impossible to accept this determination, and my specimens are almost typical *P. pusilla*. Two other records I have marked as doubtful—*P. cucullata* in New South Wales and *P. reflexa* in Queensland. While I think it quite likely that the former may occur in southern New South Wales, all the specimens under that name which I have inspected must be referred to a very distinct species, Dr. Rogers' *P. falcata*. Bailey's description of *P. reflexa* (Q'land Flora) seems to me to indicate *P. revoluta*, which he regards as conspecific; but a wide experience of both forms in New South Wales has convinced me that Brown was quite right in separating them. I have omitted Tasmania for *P. obtusa*, as all the Tasmanian plants under this name, which I have collected or seen, are typical specimens of the allied species *P. decurva*. About *P. depauperata* little seems to be known, but I have retained it because Bailey's description appears to indicate a valid species, and it is quite likely that a plant apparently not recorded south of Cairns should be distinct from southern forms.

Seven species occur in all States except Western Australia, viz.—*P. concinna*, *P. curta*, *P. nutans*, *P. pedunculata*, *P. mutica*, *P. parviflora*, *P. longifolia*. Two occur in all States except Queensland: *P. nana* and *P. barbata*. Four are restricted to New South Wales, Victoria, and Tasmania: *P. pedoglossa*, *P. falcata*, *P. alpina*, *P. decurva*. Except Victoria and Tasmania, each State has one or more species not known at present in any other State—Queensland: *P. depauperata*; New South Wales: *P. clavigera*, *P. furcillata*, *P. coccinea*, *P. Daintreyana*; South Australia: *P. Verceanae*; Western Australia: *P. Rogersii*, *P. constricta*, *P. recurva*, *P. Sargentii*, *P. turfosa*, *P. pyramidalis*.

The total number of species for each State (excluding those marked doubtful) is as follows: New South Wales 33, Victoria 32, Tasmania 22, South Australia 21, Queensland 16, Western Australia 11.

Abbreviations used in the Table of Distribution are:

Fitzg. = Fitzgerald. Australian Orchids, Vol. i or ii, and number of part.

Benth. = Bentham, Flora Australiensis, Vol. vi.

Q. Fl. = Bailey, Queensland Flora.

Intr. S.A. Orch. = Rogers, Introduction to the Study of South Australian Orchids.

S.A. Orchids = Rogers, South Australian Orchids.

Orch. Vic. = Pescott, Orchids of Victoria.

Orch. N.S.W. = Rupp, Guide to the Orchids of New South Wales.

W.A. Orch. = Mrs. E. Pelloe, Western Australian Orchids.

Vict. Nat. = *The Victorian Naturalist*.

Linn. Soc. N.S.W. = PROCEEDINGS OF THE LINNEAN SOCIETY OF NEW SOUTH WALES.

Royal Soc. Vict. = *Proceedings of the Royal Society of Victoria*.

Royal Soc. S. Aust. = *Proceedings of the Royal Society of South Australia*.

Royal Soc. W. Aust. = *Proceedings of the Royal Society of Western Australia*.

Journ. W.A. Nat. Hist. Soc. = *Journal of the Western Australian Natural History Society*.

An asterisk (*) denotes that the reference is primarily to an illustration.

DISTRIBUTION OF AUSTRALIAN SPECIES.

With References to Descriptions or Illustrations.

- P. ophioglossa* R. Br. Q'land, N.S.W. (Fitzg., I, 6*; Orch. N.S.W., 99*).
var. *collina* Rupp. N.S.W. (Linn. Soc. N.S.W., liv, 1929*).
- P. concinna* R. Br. Q'land, N.S.W., Vict., Tas., S. Aust. (Fitzg., I, 6*; Orch. N.S.W., 100*).
- P. acuminata* R. Br. Q'land, N.S.W., Vict. (Fitzg., I, 5*; Vict. Nat., Aug., 1926, 102*).
var. *ingens* Rupp. Vict. (Linn. Soc. N.S.W., liii, 1928).
- P. Baptistii* Fitzg. Q'land, N.S.W. (Fitzg., I, 1* (see note above); Orch. N.S.W., 102*).
- P. curta* R. Br. Q'land, N.S.W., Vict., Tas., S. Aust. (Fitzg., I, 5*; Intr. S.A. Orch., 17*).
- P. nutans* R. Br. Q'land, N.S.W., Vict., Tas., S. Aust. (Fitzg., I, 6*; Orch. N.S.W., 103*).
var. *hispidula* R. Br. Q'land, N.S.W. [Others?] (Fitzg., I, 6*).
- P. Verecunac* Rogers. S. Aust. (S.A. Orchids, 39).
- P. depauperata* Bailey. Q'land (Q. Fl., 1577).
- P. clavigera* Fitzg. N.S.W. (Moore and Betche, Flora of N.S.W., p. 400).
- P. nana* R. Br. N.S.W., Vict., Tas., S. Aust., W. Aust. (Intr. S.A. Orch., 13*; Vict. Nat., Aug., 1926, 106*).
- P. pedoglossa* Fitzg. N.S.W., Vict., Tas. (Fitzg., I, 3*; Vict. Nat., July, 1926, 74*).
- P. pedunculata* R.Br. Q'land, N.S.W., Vict., Tas., S. Aust. (Fitzg., I, 5*; Vict. Nat., July, 1926, 74*).
- P. mutica* R. Br. Q'land, N.S.W., Vict., Tas., S. Aust. (Fitzg., I, 2*; Intr. S.A. Orch., 16*).
- P. cyenocephala* Fitzg. N.S.W., Vict., Tas., S. Aust. (Fitzg., I, 2*; Vict. Nat., July, 1926, 71*).
- P. rufa* R. Br. Q'land, N.S.W., Vict., Tas., S. Aust., W. Aust. (Fitzg., I, 2*; Vict. Nat., Aug., 1926, 106*).
- P. pusilla* Rogers. N.S.W., Vict., Tas., S. Aust. (Royal Soc. S. Aust., xlii, 1918*; Vict. Nat., Aug., 1926, 106*).
- var. *promineus* Rupp. N.S.W. (Linn. Soc. N.S.W., lvi, 1931).
- P. Mitchellii* Lindl. Q'land, N.S.W., Vict., S. Aust. (Vict. Nat., Aug., 1926, 106*; S.A. Orchids, 42).
- P. squamata* R. Br. N.S.W., Vict., Tas. ?, S. Aust. (Fitzg., I, 6*; S.A. Orchids, 42).
- P. Woolfsii* Fitzg. N.S.W., Vict. (Fitzg., I, 2*; Vict. Nat., Dec., 1928, 223*).
- P. furcillata* Rupp. N.S.W. (Linn. Soc. N.S.W., iv, 1930, p. 415).
- P. cucullata* R. Br. N.S.W. ?, Vict., Tas., S. Aust. (Royal Soc. Vict., xxviii, n. ser., Part 1*; Orch. Vic., 32*).
- P. falcata* Rogers. N.S.W., Vict., Tas. (Royal Soc. Vict., l.c.*; Vict. Nat., July, 1926, 71*).
- P. alpina* Rogers. N.S.W., Vict., Tas. (Royal Soc. Vict., l.c.*; Vict. Nat., l.c.*).
- P. furcata* Lindl. N.S.W., Vict., Tas., S. Aust. (Royal Soc. Vict., l.c.*; Vict. Nat., Aug., 1926, 106*).
- P. gracilis* Nicholls. Vict., Tas. (Vict. Nat., March, 1927, 324*).
- P. grandiflora* R. Br. Q'land, N.S.W., Vict. (Vict. Nat., Aug., 1928, 112*).
- P. constricta* Sargent. W. Aust. (Royal Soc. W. Aust., 4, 1907; W.A. Orch.).
- P. Toveyana* Ewart & Shar. Vict., Tas. (Vict. Nat., July, 1926, 74*).
- P. alata* Reichb. f. N.S.W., Vict., Tas., S. Aust. (Fitzg., I, 3*, as *P. striata*; Vict. Nat., Aug., 1926, 102*).
- P. robusta* Rogers. Vict., S. Aust., W. Aust (Royal Soc. S. Aust., li, 1927; Intr. S.A. Orch., 8*, as *P. reflexa*).
- P. Rogersii* Coleman. W. Aust. (Vict. Nat., Sept., 1929, 100*; W.A. Orch.*).
- P. revoluta* R. Br. Q'land, N.S.W., Vict. (Fitzg., I, 5*, in *P. reflexa*; Orch. Vic., foll. p. 32*).
- P. reflexa* R. Br. Q'land ?, N.S.W. (Fitzg., I, 5*; Orch. N.S.W., 110*).
- P. coccinea* Fitzg. N.S.W. (Fitzg., I, 6*; Orch. N.S.W., 112*).
- P. truncata* Fitzg. N.S.W., Vict. (Fitzg., I, 4*; Orch. N.S.W., 109*).
- P. obtusa* R. Br. Q'land, N.S.W., Vict., S. Aust. (Fitzg., I, 6*; Orch. N.S.W., 113*; Vict. Nat., July, 1926, 74*).
- P. decurva* Rogers. N.S.W., Vict., Tas. (Royal Soc. S. Aust., xlvii, 1923*; Orch. Vic., foll. p. 43*).
- P. recurva* Benth. W. Aust. (Benth., 360; Fitzg., II, 2*; W.A. Orch., 64*).
- P. pyramidalis* Lindl. W. Aust. (Benth., 357; W.A. Orch.).
- P. parviflora* R. Br. Q'land, N.S.W., Vict., Tas., S. Aust. (Fitzg., I, 7*; Vict. Nat., July, 1926, 74*).
- P. Sargentii* Andrews. W. Aust. (Journ. W.A. Nat. Hist. Soc., May, 1905; W.A. Orch.*).

- P. Daintreyana* F.v.M. N.S.W. (Fitzg., I, 6*).
- P. longifolia* R. Br. Q'land, N.S.W., Vict., Tas., S. Aust. (Fitzg., I, 1*; Intr. S.A. Orch., 14*).
- P. vittata* Lindl. Vict., Tas., S. Aust., W. Aust. (Intr. S.A. Orch., 13*; Vict. Nat., Aug., 1926, 102*).
- var. *subdifformis* Nicholls. W. Aust. (Vict. Nat., Feb., 1933, 253).
- var. *viridiflora* Nicholls. W. Aust. (Vict. Nat., l.c.).
- P. barbata* Lindl. N.S.W., Vict., Tas., S. Aust., W. Aust. (Fitzg., I, 7*; Orch. Vic., foll. p. 32*).
- P. turfosa* Endl. W. Aust. (Fitzg., II, 2*; W.A. Orch., p. 64*).

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